

CLAIMS

What is claimed is:

1. A print head die forming method comprising:
 - forming a first patterned masking layer sufficient to expose a desired area of a first surface of a substrate;
 - after forming the first patterned masking layer, forming a second patterned masking layer sufficient to expose less than the entirety of the desired area of the first surface;
 - forming a slot portion in the substrate through the second patterned masking layer; and,
 - removing additional substrate material to form a fluid-handling slot.
2. The method of claim 1, wherein said act of forming a first patterned masking layer comprises forming a hard mask.
3. The method of claim 1, wherein said act of forming a second patterned masking layer comprises forming a photo-resist layer.
4. The method of claim 1, wherein said act of forming a slot portion comprises etching the slot portion.
5. The method of claim 1, wherein said act of removing forms a fluid-

handling slot having a through region positioned between two shallow regions.

6. The method of claim 1, wherein said act of removing comprises wet etching the additional substrate material.

7. The method of claim 1 further comprising, after said act of forming a slot portion and before removing the additional substrate material, removing a portion of the second patterned masking layer.

8. A print cartridge incorporating a print head die formed in accordance with the method of claim 1.

9. A fluid-feed slot forming method comprising:
patterning a hard mask on a first substrate surface sufficient to expose a first area of the first surface;
forming a slot portion in the substrate through less than an entirety of the first area of the first surface, the slot portion having a cross-sectional area at the first surface that is less than a cross-sectional area of the first area; and,
after forming the slot portion, etching the substrate to remove material from within the first area to form a fluid-handling slot.

10. The method of claim 9, wherein said act of forming a slot portion forms a slot portion having a cross-sectional area that comprises a subset of the

first area.

11. The method of claim 9, wherein said act of patterning a hard mask comprises covering the entire first substrate surface with the hard mask and subsequently removing hard mask material from the first area of the surface.

12. A print cartridge incorporating a substrate formed in accordance with the method of claim 9.

13. A print head substrate forming method comprising:
exposing a first portion of a substrate surface through a hard mask;
forming a photoresist over the hard mask and the first portion;
removing at least some of the photoresist to expose a second portion of the substrate surface through which a slot portion is to be formed;
dry etching the substrate through the photoresist sufficient to form the slot portion; and,
after said dry etching, wet etching the substrate to form a fluid-handling slot.

14. The method of claim 13, wherein said act of exposing comprises applying a hard mask over the entire substrate surface and removing hard mask material from over the first portion.

15. The method of claim 13, wherein said act of removing exposes a second portion that comprises a subset of the first portion.
16. The method of claim 13, wherein said act of removing exposes a second portion having an area that is less than an area of the first portion.
17. The method of claim 13, wherein said act of exposing comprises forming a hard mask over less than an entirety of the first surface.
18. The method of claim 13, wherein said act of wet etching comprises anisotropically etching the slot.
19. The method of claim 13, wherein said act of dry etching comprises alternating acts of etching and passivating.
20. A print cartridge incorporating a print head die formed in accordance with the method of claim 13.
21. A print head forming method comprising:
forming a fluid-handling slot in a substrate, the slot having a long axis,
wherein the slot has a cross-section taken transverse the long axis that is defined,
at least in part, by one sidewall, wherein at least a first portion of the one sidewall

is generally parallel to a first surface of the substrate, and wherein a second portion of the one sidewall is generally perpendicular to the first surface.

22. The method of claim 21, wherein said act of forming a fluid-handling slot in a substrate comprises:

forming a slot portion into a first surface of a substrate; and,
etching the substrate to remove substrate material proximate the slot portion to form a fluid-handling slot.

23. The method of claim 22, wherein said act of forming a slot portion comprises one or more of: laser machining and mechanically cutting.

24. The method of claim 22, wherein said act of forming a slot portion comprises multiple removal steps.

25. The method of claim 24, wherein at least one of the multiple removal steps comprises dry etching.

26. The method of claim 24, wherein at least one of the multiple removal steps comprises patterning a hard mask.

27. The method of claim 26, wherein said act of patterning a hard mask comprises a lift-off process.

28. The method of claim 22, wherein said act of etching comprises wet etching.

29. A print cartridge incorporating a print head die formed in accordance with the method of claim 21.

30. A fluid-handling slot forming method comprising:
forming a fluid-handling slot in a substrate, wherein the fluid-handling slot does not have a re-entrant profile, and wherein said act of forming comprises removing substrate material using at least one act of wet etching, and at least one act that is not wet etching.

31. The method of claim 30, wherein said act that is not wet etching comprises dry etching.

32. A print cartridge incorporating a substrate formed in accordance with the method of claim 30.